

Application No. 09/909,971
Amendment under 37 CFR 1.111
Reply to Office Action dated July 9, 2004
October 12, 2004

IN THE CLAIMS

Please substitute the following claims for the pending claims with the same numbers respectively:

Claim 1 (Original): A signal processing unit which calculates the value of v^p , where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising:

an exponent part extraction section which extracts a bit series from said exponent part of said floating point data item;

a mantissa part extraction section which extracts the most significant K bits from said mantissa part of said floating point data item;

a first conversion section which inputs the output e of said exponent part extraction section and outputs the value of a function $X(e)$ thereof;

a second conversion section which inputs the output f of said mantissa part extraction section and outputs the value of a function $Y(f)$ thereof; and

a multiplier section which multiplies together the output

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value from said first conversion section and the output value
from said second conversion section;

wherein:

when i and j are taken as integers, said function $X(i)$ is a
function which returns the value:

$$X(i) = 2^{((i - ((1 \ll E - 1) - 1) - K) * p)},$$

and said function $Y(j)$ is a function which returns the value:

$$Y(j) = ((1 \ll K) + j)^p.$$

Claim 2 (Original): A signal processing unit according to
claim 1, wherein:

said first conversion section is constituted as a table in which,
for each address i , the value of $X(i)$ is stored in advance; and

said second conversion section is constituted as a table in
which, for each address j , the value of $Y(j)$ is stored in
advance.

Claim 3 (Original): A signal processing unit which
calculates the value of v^p , where v is an item of floating point
data made up from an E -bit exponent part and an F -bit mantissa
part, and p is a constant, comprising:

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an exponent part extraction section which extracts a bit series from said exponent part of said floating point data item;

a mantissa part extraction section which extracts the most significant K bits from said mantissa part of said floating point data item;

a first conversion section which inputs the output e of said exponent part extraction section and outputs the value of a function $X(e)$ thereof;

a second conversion section which inputs the output f of said mantissa part extraction section and outputs the value of a function $Y(f)$ thereof; and

a multiplier section which multiplies together the output value from said first conversion section and the output value from said second conversion section;

wherein:

when i and j are taken as integers, for some real number S, said function $X(i)$ is a function which returns the value:

$$X(i) = 2^{((i - ((1 < E - 1) - 1) - K) * p) * S},$$

and said function $Y(j)$ is a function which returns the value:

$$Y(j) = ((1 < K) + j)^p / S.$$

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Claim 4 (Original): A signal processing unit according to claim 3, wherein:

said first conversion section is constituted as a table in which, for each address i , the value of $X(i)$ is stored in advance;

and said second conversion section is constituted as a table in which, for each address j , the value of $Y(j)$ is stored in advance.

Claim 5 (Currently amended): A signal processing unit which, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculates and outputs the value of v raised to ~~the~~ a first power \pm and converted to an integer value, comprising:

an exponent and mantissa part extraction section which, when the number of bits in which $(N-2)$ is expressed in binary notation is M , extracts a bit field ~~consisting of at least the~~ including a predetermined number of lowermost M bits of said exponent part and ~~at least the~~ a predetermined number of uppermost $(N-1)$ bits

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of said mantissa part; and+

a third conversion section which, when the value expressed by said bit field which has been extracted by said exponent and mantissa part extraction section is w , stores in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and which inputs the value w given by said bit field and reads out the corresponding value from said table.

Claim 6 (Original): A signal processing method operable to calculate the value of v^p , where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

extracting the most significant K bits from said mantissa part of said floating point data item;

inputting the output e of the exponent part extraction and outputting the value of a function $X(e)$ thereof, by storing in a table, for integer values of i , values $X(i)$ to be returned given by $2^{((i - ((1 < E - 1) - 1) - K) * p)}$;

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inputting the output f of the mantissa part extraction and outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j , values $Y(j)$ to be returned given by $((1 \leq K) + j)^p$; and:

multiplying together the output values of said functions $X(e)$ and $Y(f)$.

Claim 7 (Currently amended): A signal processing method for, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the a first power p and converted to an integer value, said method comprising the steps of:

~~when the number of bits in which $(N-2)$ is expressed in binary notation is M , extracting a bit field consisting of at least the~~ including a predetermined number of lowermost M bits of said the exponent part and at least the a predetermined number of uppermost $(N-1)$ bits of said the mantissa part when the number of bits in which $(N-2)$ expressed in binary notation is M ; and-

~~when the value expressed by said bit field which has been~~

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~~thus extracted is w,~~ storing in a table in advance the values of
v converted into integer values in all ~~the~~ addresses where w is
extracted by ~~this~~ the bit field, and inputting the value w given
by ~~said the~~ the bit field and reading out the corresponding value
from ~~said the~~ the table when the value expressed by the bit field is
w.

Claim 8 (Original): A computer readable medium storing
instructions for performing a signal processing method operable
to calculate the value of v^p , where v is an item of floating
point data made up from an E-bit exponent part and an F-bit
mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said
floating point data item;

extracting the most significant K bits from said mantissa
part of said floating point data item;

inputting the output e of the exponent part extraction and
outputting the value of a function $X(e)$ thereof, by storing in a
table, for integer values of i, values $X(i)$ to be returned given
by $2^{((i - ((1 < E - 1) - 1) - K) * p)}$;

inputting the output f of the mantissa part extraction and

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outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j , values $Y(j)$ to be returned given by $((1 < K) + j)^p$; and:

multiplying together the output values of said functions $X(e)$ and $Y(f)$.

Claim 9 (Currently amended): A computer readable medium storing instructions for performing a signal processing method for, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the a first power \pm and converted to an integer value, said method comprising the steps of:

~~when the number of bits in which $(N-2)$ is expressed in binary notation is M ,~~ extracting a bit field ~~consisting of at least the~~ including a predetermined number of lowermost M bits of said the exponent part and at least the a predetermined number of uppermost $(N-1)$ bits of said the mantissa part when the number of bits in which $(N-2)$ expressed in binary notation is M ; and

~~when the value expressed by said bit field which has been~~

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~~thus extracted is w~~, storing in a table in advance the values of v converted into integer values in all ~~the~~ addresses where w is extracted by ~~this~~ the bit field, and inputting the value w given by ~~said~~ the bit field and reading out the corresponding value from ~~said~~ the table when the value expressed by the bit field is w.

Claim 10 (Original): A program product for performing a signal processing method operable to calculate the value of v^p , where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

extracting the most significant K bits from said mantissa part of said floating point data item;

inputting the output e of the exponent part extraction and outputting the value of a function $X(e)$ thereof, by storing in a table, for integer values of i, values $X(i)$ to be returned given by $2^{((i - ((1 \ll E - 1) - 1) - K) * p)}$;

inputting the output f of the mantissa part extraction and

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outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j , values $Y(j)$ to be returned given by $((1 < K) + j)^p$; and:

multiplying together the output values of said functions $X(e)$ and $Y(f)$.

Claim 11 (Currently amended): A program product for performing a signal processing method for, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the a first power \pm and converted to an integer value, said method comprising the steps of:

~~when the number of bits in which $(N-2)$ is expressed in binary notation is M ,~~ extracting a bit field ~~consisting of at least the~~ including a predetermined number of lowermost M bits of ~~said the~~ exponent part and ~~at least the~~ a predetermined number of uppermost $(N-1)$ bits of ~~said the~~ mantissa part when the number of bits in which $(N-2)$ expressed in binary notation is M ; and

~~when the value expressed by said bit field which has been~~

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~~thus extracted is w,~~ storing in a table in advance the values of
v converted into integer values in all ~~the~~ addresses where w is
extracted by ~~this~~ the bit field, and inputting the value w given
by ~~said~~ the bit field and reading out the corresponding value
from ~~said~~ the table when the value expressed by the bit field is
w.